

REMARKS

Applicants thank the Examiner for the thorough consideration given the present application. Claims 1-7 and 9-15 are pending in this application. Claims 1, 9, and 13 are amended. Claims 14 and 15 are added. Claims 1, 9, and 13 are independent. Reconsideration of this application, as amended, is respectfully requested.

Reasons for Entry of this Amendment

Entry of the present Amendment is respectfully requested in view of the fact that the changes herein automatically place the application in condition for allowance.

In the alternative, if the Examiner does not agree that this application is in condition for allowance, it is respectfully requested that the present Amendment be entered for the purpose of appeal. This Amendment was not presented at an earlier date in view of the fact that Applicants did not fully appreciate the Examiner's position until the final Office Action was reviewed.

Drawings

The drawings filed with the present application are approved. The Examiner is respectfully requested to provide a Notice of Draftsperson's Patent Drawing Review, Form PTO-948, confirming approval of the formal drawings by the Official Draftsperson, with the next official communication is respectfully requested.

Rejections Under 35 U.S.C. §103(a)

Claims 1-3, 5, and 6 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,105,454 to Bacchi et al. in view of U.S. Patent No. 6,386,859 to Hehl. Claims 4 and 9-12 stand rejected as being unpatentable over Bacchi et al. in view of Hehl, and further in view of U.S. Patent No. 5,860,331 to Hashimoto et al. Claims 7 and 13 stand rejected as being unpatentable over Bacchi et al. in view of Hehl, and further in view of U.S. Patent No. 3,947,208 to Broderick. These rejections are respectfully traversed.

While not conceding the appropriateness of the rejections, but merely to advance prosecution, independent claims 1, 9, and 13 are amended to recite a robot for a production machine having combination of elements, including a chuck fixed to the distal-side shaft, wherein the second arm rotates over an angle twice that over which the first arm rotates, and the chuck rotates over an angle one-half that over which the second arm rotates so that the chuck assumes a constant orientation and passes over the first proximal-side pulley when the rotation drive unit is operated.

Added claims 14 and 15 are supported by the original specification and are directed to additional aspects of the present invention.

It is respectfully submitted that the instantly amended claims patentably distinguish over the art cited by the Examiner, including Bacchi et al., Hehl, Hashimoto et al., and Broderick.

In contrast to Applicants' claimed invention, Bacchi et al. merely shows a robot arm system that comprises a torso link 12, an upper arm 15, first drive pulley 54, second drive

pulley 72, forearm drive pulley 58, a post 57, a forearm drive spindle 56, and upper arm pulley 76, as well as first, second, and third motors 50, 52, and 92, as shown in FIG. 2. Fluid pressure outlet 36 of hand 30 can move in a straight line 102, as shown in FIG. 3, when the motor controller 100 moves the first, second, and third motors 50, 52, and 92. However, Bacchi et al. does not teach or suggest a chuck fixed to the distal-side shaft, wherein the second arm rotates over an angle twice that over which the first arm rotates, and the chuck rotates over an angle one-half that over which the second arm rotates so that the chuck assumes a constant orientation and passes over the first proximal-side pulley when the rotation drive unit is operated, as set forth in the combinations of elements recited in claims 1, 9, and 13.

The Office Action relies on Hehl for a teaching of an extraction means having an injection molding machine and a support base disposed on a bed, the extractor having grippers which allow the extractor to remove an article such as a chuck. However, Hehl does not teach or suggest the above-cited limitations of claims 1, 9, and 13 and, therefore, fails to cure the deficiencies of Bacchi et al. as a primary reference.

The Office Action relies on Hashimoto et al. for a teaching of a ratio of distance between the center point of the pulley portion of the second output shaft member and that of the basal pulley portion of the second arm to the distance between the center point of the basal pulley portion of the second arm and that of the hand being 1:1. However, like Hehl, Hashimoto et al. does not teach or suggest the above-cited limitations of claim 1, 9, and 13 and, therefore, fails to cure the deficiencies of Bacchi et al. in view of Hehl.

The Office Action relies upon Broderick for a teaching of an injection molding machine having a horizontal robot arm that moves between tie bars and is rotatable in a vertical direction, the arm having grippers to remove an article and being supported on a movable support base. However, like Hehl and Hashimoto et al., Broderick fails to teach or suggest the above-cited limitations of claims 1, 9, and 13 and therefore, does not cure the deficiencies of Bacchi et al. in view of Hehl.

In view of the foregoing, it is respectfully submitted that independent claims 1, 9, and 13 are not disclosed or made obvious by the prior art of record, including Bacchi et al., Hehl, Hashimoto et al., and Broderick. Since the dependent claims depend directly or indirectly from allowable independent claims 1, 9, and 13, these claims are also allowable for at least the reasons set forth above, as well as the additional limitations set forth by these claims. Therefore, reconsideration and withdrawal of the rejections under 35 U.S.C. §103(a) and allowance of all claims are respectfully requested.

Conclusion

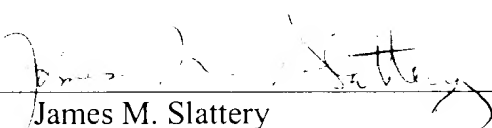
All the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. It is believed that a full and complete response has been made to the outstanding Office Action, and that the present application is in condition for allowance.

However, if there are any outstanding issues, the Examiner is invited to telephone Sam Bhattacharya, Reg. No. 48,107, at 703-205-8000 in an effort to expedite prosecution.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17, particularly extension of time fees.

Respectfully submitted,
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MARKED-UP COPY OF AMENDED CLAIMS

Please **amend claims 1, 9, and 13** as follows:

1. (Amended) A robot for a production machine, comprising:

a rotation drive unit disposed on a support base;

a first arm, a proximal end portion of the first arm being fixed to a rotary shaft of the rotation drive unit;

a first proximal-side pulley disposed coaxially with the rotary shaft and fixed to the support base;

a second proximal-side pulley fixed to a distal end portion of the first arm;

an intermediate shaft rotatably supported on the distal end portion of the first arm, the intermediate shaft penetrating a center portion of the second proximal-side pulley;

a first distal-side pulley provided integrally with the intermediate shaft;

a first rotation transmission section for drivingly connecting the first distal-side pulley and the first proximal-side pulley;

a second arm, a proximal end portion of the second arm being fixed to the intermediate shaft;

a distal-side shaft rotatably supported on a distal end portion of the second arm;

a second distal-side pulley provided integrally with the distal-side shaft;

a second rotation transmission section for drivingly connecting the second distal-side pulley and the second proximal-side pulley; and

a chuck fixed to the distal-side shaft, wherein the second arm rotates over an angle twice that over which the first arm rotates, and the chuck rotates over an angle one-half that over which the second arm rotates so that the chuck assumes a constant orientation and passes over the first proximal-side pulley when the rotation drive unit is operated, and tooth-number ratio between the first proximal-side pulley and the first distal-side pulley is set to $n:1$, and the tooth-number ratio between the second proximal-side pulley and the second distal-side pulley is set to $1:m$.

9. A robot for a production machine, comprising:

a rotation drive unit disposed on a support base;

a first arm, a proximal end portion of the first arm being fixed to a rotary shaft of the rotation drive unit;

a first proximal-side pulley disposed coaxially with the rotary shaft and fixed to the support base;

a second proximal-side pulley fixed to a distal end portion of the first arm;

an intermediate shaft rotatably supported on the distal end portion of the first arm, the intermediate shaft penetrating a center portion of the second proximal-side pulley;

a first distal-side pulley provided integrally with the intermediate shaft;

a first rotation transmission section for drivingly connecting the first distal-side pulley and the first proximal-side pulley;

a second arm, a proximal end portion of the second arm being fixed to the intermediate shaft;

a distal-side shaft rotatably supported on a distal end portion of the second arm;

a second distal-side pulley provided integrally with the distal-side shaft;

a second rotation transmission section for drivingly connecting the second distal-side pulley and the second proximal-side pulley; and

a chuck fixed to the distal-side shaft, wherein:

the second arm rotates over an angle twice that over which the first arm rotates, and the chuck rotates over an angle one-half that over which the second arm rotates so that the chuck assumes a constant orientation and passes over the first proximal-side pulley when the rotation drive unit is operated,

the tooth-number ratio between the first proximal-side pulley and the first distal-side pulley is set to $n:1$, the tooth-number ratio between the second proximal-side pulley and the second distal-side pulley is set to $1:m$, and the distance between the center of the second proximal-side pulley and the center of the second distal-side pulley is set to be equal to the distance between the center of the first proximal-side pulley and the center of the first distal-side pulley; and

the support base is disposed on a bed of an injection molding machine, and the chuck is moved through a space between the upper and lower tie bars.

13. A robot for a production machine, comprising:

a rotation drive unit disposed on a support base;

a first arm, a proximal end portion of the first arm being fixed to a rotary shaft of the rotation drive unit;

a first proximal-side pulley disposed coaxially with the rotary shaft and fixed to the support base;

a second proximal-side pulley fixed to a distal end portion of the first arm;

an intermediate shaft rotatably supported on the distal end portion of the first arm, the intermediate shaft penetrating a center portion of the second proximal-side pulley;

a first distal-side pulley provided integrally with the intermediate shaft;

a first rotation transmission section for drivingly connecting the first distal-side pulley and the first proximal-side pulley;

a second arm, a proximal end portion of the second arm being fixed to the intermediate shaft;

a distal-side shaft rotatably supported on a distal end portion of the second arm;

a second distal-side pulley provided integrally with the distal-side shaft;

a second rotation transmission section for drivingly connecting the second distal-side pulley and the second proximal-side pulley; and

a chuck fixed to the distal-side shaft, wherein:

the second arm rotates over an angle twice that over which the first arm rotates,
and the chuck rotates over an angle one-half that over which the second arm rotates so that

the chuck assumes a constant orientation and passes over the first proximal-side pulley when the rotation drive unit is operated,

the tooth-number ratio between the first proximal-side pulley and the first distal-side pulley is set to $n:1$, the tooth-number ratio between the second proximal-side pulley and the second distal-side pulley is set to $1:m$;

a rotation mechanism is disposed at the upper end of an injection molding machine, the rotation mechanism including a horizontal arm whose one end is supported to be rotatable about an axis extending in the vertical direction, the support base being attached to the other end of the horizontal arm, and the chuck being moved through a space between tie bars disposed at two different positions in the transverse direction of the injection molding machine; and

the rotation mechanism is supported by a movement mechanism for effecting movement in the front/back direction of the injection molding machine.

CLAIMS 14 AND 15 ARE ADDED.